

**PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Martin, et al.

Serial No.: 10/006,875

Filed: December 5, 2001

For: APPARATUS AND METHOD FOR  
HEATING CATALYST FOR START-UP  
OF A COMPACT FUEL PROCESSOR

Art Unit: 1797

Examiner: Duong, Thanh P.

Attorney Docket No.: 00041-DV3

Confirmation No. 5118

**APPEAL BRIEF**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

**INTRODUCTION**

This is an appeal from the Final Office Action of the Primary Examiner mailed September 17, 2009. A Notice of Appeal was received by the U.S. Patent and Trademark Office on March 17, 2010. A five month extension of time is hereby requested to extend the deadline for submitting this Appeal Brief. Applicants authorize the Commissioner to charge the fee for the extension of time, the fee set forth in 37 CFR §41.20(b)(2) for the filing of this Appeal Brief, and any additional fees which may be deemed to be required for consideration of this Appeal Brief, or credit any overpayment to Deposit Account No. 03-1620, referencing Attorney Docket No. 00041-DV3.

#### REAL PARTY IN INTEREST

The real party in interest for the above-identified application is Texaco, Inc. An assignment to Texaco, Inc. was recorded with the U.S. Patent and Trademark Office on March 7, 2002, beginning at Reel 012684/Frame 0774.

#### RELATED APPEALS AND INTERFERENCES

The above-identified application claims priority from Provisional Application No. 60/251,226, filed on December 5, 2000. Application No. 10/006,876 also claims priority from Provisional Application No. 60/251,226. A Notice of Appeal for Application No. 10/006,876 was received by the U.S. Patent and Trademark Office on July 27, 2010.

#### STATUS OF CLAIMS

Claims 1-5 and 13-24 stand rejected.

Claims 1-5 and 13-24 are the subject of this appeal.

Claim 6-12 were withdrawn as being directed to a non-elected invention.

#### STATUS OF AMENDMENTS

No new claim amendments were submitted in response to the Final Office Action mailed September 17, 2009.

#### SUMMARY OF CLAIMED SUBJECT MATTER

##### Independent Claim 1

Independent claim 1 relates to a method for heating a catalyst bed for start-up. The method is claimed to include the following steps: (1) providing a catalyst bed having an upstream face and a downstream face; (2) providing an electrical heating element positioned along one face of the catalyst bed; (3) passing a small

flow of reactants through the electrical heating element and catalyst bed; and (4) heating the electrical heating element to initiate an exothermic reaction at the face of the catalyst bed, wherein the heat of reaction propagates throughout the catalyst bed thereby heating the catalyst bed for start-up.

The method of claim 1 is described throughout the specification and in detail on page 11, lines 11-31 through page 12, lines 1-20. Figure 3 illustrates one illustrative embodiment of a face heater for a catalyst bed as described in the method of claim 1. In Figure 3, face heater 300 can be utilized to provide heat to a catalyst bed face 310. In this illustrative embodiment, face heater 300 is an electrical heating element formed in a spiral design along the face of the catalyst bed 310.

#### Independent Claim 13

Independent claim 13 relates to a method for heating a catalyst bed. The method is claimed to include the following steps: (1) providing an electrical heating element positioned within a cooling coil located substantially within the catalyst bed; and (2) heating the electrical heating element thereby heating the catalyst bed to a desired temperature.

The method of claim 13 is described throughout the specification and in detail on page 11, lines 11-31 through page 12, lines 1-4; page 12, lines 21-27; and page 13, lines 1-10. Figure 4 illustrates one illustrative embodiment of weaving a monolithic catalyst bed with an electrical heating element as described in the method of claim 13. As depicted in Figure 4, the weaving design (such as a coil) may be designed for optimal heating of the catalyst bed.

Independent Claim 16

Amended independent claim 16 relates to a method for heating a catalyst bed to a desired temperature. The method is claimed to include the following steps: (1) providing a catalyst bed in communication with an electrical heating element wherein the electrical heating element is a face heater; and (2) heating the electrical heating element so as to maintain the desired temperature of the catalyst bed.

The method of claim 16 is described throughout the specification and in detail on page 11, lines 11-31 through page 12, lines 1-20. Figure 3 illustrates one illustrative embodiment of a face heater for a catalyst bed as described in the method of claim 1. In this illustrative embodiment, face heater 300 is an electrical heating element formed in a spiral design along the face of the catalyst bed 310.

Independent Claim 22

Amended independent claim 22 relates to a method for heating a catalyst bed to a desired temperature. The method is claimed to include the following steps: (1) positioning an electrical heating element upstream of the catalyst bed wherein the electrical heating element is a face heater; and (2) passing a fluid across the electrical heating element and through the catalyst bed, wherein the catalyst bed is heated to the desired temperature.

The method of claim 22 is described throughout the specification and in detail on page 11, lines 11-31 through page 12, lines 1-20. Figure 3 illustrates one illustrative embodiment of a face heater for a catalyst bed as described in the method of claim 22. In Figure 3, by passing a small flow of reactants through the electrical heating element and catalyst bed, the exothermic reaction is initiated at the face of the catalyst bed. Figure 5 illustrates one illustrative embodiment of wrapping a monolithic catalyst bed with an electrical heating element as described in claim 22.

GROUND OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1-5, 16-20, and 22-24 are anticipated by Yoshizaki et al. (U.S. Patent No. 5,582,805) under 35 U.S.C. §102(b).

Whether claims 16, 17, and 20 are anticipated by Brunson et al. (U.S. Patent No. 5,512,251) under 35 U.S.C. §102(b).

Whether claims 13-21 are unpatentable over Bayer et al. (U.S. Patent No. 5,562,885) in view of Helmers (U.S. Patent No. 2,443,423) under 35 U.S.C. §103(a).

ARGUMENT

Claims 1-5, 16-20, and 22-24 stand rejected under 35 U.S.C. §102(b) as being anticipated by Yoshizaki et al. (U.S. Patent No. 5,582,805) ("Yoshizaki").

Independent claim 1 stands rejected under 35 U.S.C. §102(b) as being anticipated by Yoshizaki. Claim 1 recites a method for heating a catalyst bed for startup comprising: providing a catalyst bed having an upstream face and a downstream face; providing an electrical heating element positioned along one face of the catalyst bed; passing a small flow of reactants through the electrical heating element and catalyst bed; and heating the electrical heating element to initiate an exothermic reaction at the face of the catalyst bed, wherein the heat of reaction propagates throughout the catalyst bed thereby heating the catalyst bed for start-up. See Claims Appendix.

Independent claim 16 also stands rejected under 35 U.S.C. §102(b) as being anticipated by Yoshizaki. Previously amended claim 16 recites a method for heating a catalyst bed comprising providing a catalyst bed in communication with an electrical heating element wherein the electrical heating element is a face heater; and heating the electrical heating element so as to maintain the desired temperature of the catalyst bed. See Claims Appendix. In response to the Office Action mailed July 14, 2008, claim 16 was amended to specify that the electrical heating element is a face heater. No new matter was introduced by this amendment.

Independent claim 22 also stands rejected under 35 U.S.C. §102(b) as being anticipated by Yoshizaki. Previously amended claim 22 recites a method for heating a catalyst bed to a desired temperature, comprising positioning an electrical heating element upstream of the catalyst bed wherein the electrical heating element is a face heater; and passing a fluid across the electrical heating element and through the catalyst bed, wherein the catalyst bed is heated to the desired temperature. See Claims Appendix. In response to the Office Action mailed July 14, 2008, claim 22 was amended to specify that the electrical heating element is a face heater. No new matter was introduced by this amendment.

According to M.P.E.P. §2131, "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Applicants respectfully assert that Yoshizaki does not anticipate the methods for heating a catalyst bed of claims 1-5, 16-20, and 22-24 of the present invention. Applicants respectfully disagree that Yoshizaki discloses "having . . . an electrical heating element along one face as a face heater." Office Action, p. 2.

The "electrical heating element (Fig. 15 (44/45)) along one face (col. 15, lines 4-6)" cited by the Examiner (Office Action, p. 2) is depicted in FIG. 15 of Yoshizaki. This "electrical heating element" is a band heater that heats from the outside edge of the catalyst carrier. Heating in this manner will require longer heat up times and greater energy input. In contrast, the face heater as depicted in FIG. 3 of the present invention heats the face of the catalyst bed (page 12, lines 5-20) and therefore requires less time to heat the catalyst bed for start-up (page 2, lines 29-31 through page 3, lines 1-6) and correspondingly less energy (page 3, lines 7-20).

In addition, the following is an excerpt from Yoshizaki:

FIG. 15 shows a catalytic converter according to an eighth embodiment of the present invention. This embodiment employs a metallic honeycomb catalyst carrier 44 similar to the carrier 15. An upstream or down stream end face of the carrier 44 is provided with a circular electrically conductive heater 45 made of, for example, SiC. When energized, the heater 45 provides hot spots to burn combustible components such as HC and CO contained in exhaust, to thereby increase the temperature of the carrier 44. The circular shape of the heater 45 corresponds to an annular cross-sectional area of the carrier 44 where the flow rate of the exhaust is largest.

The heater 45 of the eighth embodiment may have any other shape. FIG. 16 shows a modification of the eighth embodiment, employing a winding heater 46. The heater 46 uniformly heats the end face of the carrier 44, to promote reactions over the carrier 44 among incompletely burnt components contained in exhaust.

(Col. 15, lines 1-18) The Yoshizaki “electrical heating element” is a “circular electrically conductive heater.” (Col. 15, line 5). It may also be a “winding heater.” (Col. 15, line 15) Yoshizaki does not teach or suggest a face heater as in the present invention.

Further, assuming for the sake of argument that Yoshizaki does disclose all of the elements of claims 1-5, 16-20, and 22-24, it is not enough that Yoshizaki discloses all of the elements in isolation. The Federal Circuit requires that Yoshizaki disclose each element as “arranged in the claim.” *Lindermann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452 (Fed. Cir. 1984). Yoshizaki does not disclose the elements as arranged in claims 1-5, 16-20, and 22-24.

Because Yoshizaki fails to teach one or more of the recited elements of claims 1-5, 16-20, and 22-24, Applicants respectfully request that the rejection of claims 1-5, 16-20, and 22-24 under 35 U.S.C. §102(b) as being anticipated by Yoshizaki be reversed.

Claims 16, 17, and 20 stand rejected under 35 U.S.C. §102(b) as being anticipated by Brunson et al. (U.S. Patent No. 5,512,251) ("Brunson").

Independent claim 16 stands rejected under 35 U.S.C. §102(b) as being anticipated by Brunson. Previously amended claim 16 recites a method for heating a catalyst bed comprising providing a catalyst bed in communication with an electrical heating element wherein the electrical heating element is a face heater; and heating the electrical heating element so as to maintain the desired temperature of the catalyst bed. See Claims Appendix. In response to the Office Action mailed July 14, 2008, claim 16 was amended to specify that the electrical heating element is a face heater. No new matter was introduced by this amendment.

According to M.P.E.P. §2131, "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Applicants respectfully assert that Brunson does not anticipate the methods for heating a catalyst bed of claims 16, 17, and 20 of the present invention. Specifically, Brunson does not teach or suggest maintaining the desired temperature of the catalyst bed as in claim 16 of the present invention.

Because Brunson fails to teach one or more of the recited elements of claim 16, Applicants respectfully request that the rejection of claims 16, 17, and 20 under 35 U.S.C. §102(b) as being anticipated by Brunson be reversed.

Claims 13-21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Bayer et al. (U.S. Patent No. 5,562,885) ("Bayer") in view of Helmers (U.S. Patent No. 2,443,423) ("Helmers").

Independent claim 13 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Bayer in view of Helmers. Claim 13 recites a method for heating a catalyst bed, comprising providing an electrical heating element positioned within a



cooling coil located substantially within the catalyst bed wherein the electrical heating element is a face heater; and heating the electrical heating element thereby heating the catalyst bed to a desired temperature. See Claims Appendix.

Independent claim 16 also stands rejected under 35 U.S.C. §103(a) as being anticipated by Yoshizaki. Previously amended claim 16 recites a method for heating a catalyst bed comprising providing a catalyst bed in communication with an electrical heating element wherein the electrical heating element is a face heater; and heating the electrical heating element so as to maintain the desired temperature of the catalyst bed. See Claims Appendix. In response to the Office Action mailed July 14, 2008, claim 16 was amended to specify that the electrical heating element is a face heater. No new matter was introduced by this amendment.

According to the Examiner, “[i]t has been held that obviousness may sometimes be based on the common knowledge of persons skilled in the art without relying on a specific suggestion in a particular reference.” (Office Action, p. 5) However, according to the MPEP, rejections based on common knowledge should be judiciously applied. MPEP 2144.03. As a result, in the Response filed on September 3, 2009, Applicants respectfully requested that the Examiner provide the explicit basis for the common knowledge rejection. Applicants respectfully assert that this basis was not provided in the September 17, 2009 Final Office Action. Therefore, Applicants respectfully request that the rejection of claims 13-21 under 35 U.S.C. §103(a) as being unpatentable over Bayer in view of Helmers be reversed.

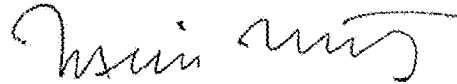
#### Conclusion

It is believed that in view of the foregoing arguments, the Board of Appeals will appreciate that (1) claims 1-5, 16-20, and 22-24 are not anticipated by Yoshizaki under 35 U.S.C. §102(b); (2) claims 16, 17, and 20 are not anticipated by Brunson under 35 U.S.C. §102(b); and (3) claims 13-21 are not unpatentable over Bayer in view of Helmers under 35 U.S.C. §103(a). It is therefore respectfully requested that

Appeal Brief  
U.S.S.N. 10/006,875  
October 18, 2010

the Examiner's rejection of the appealed claims be reversed and that the claims be allowed.

Respectfully submitted,



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CLAIMS APPENDIX

1. A method for heating a catalyst bed for start-up, comprising: providing a catalyst bed having an upstream face and a downstream face; providing an electrical heating element positioned along one face of the catalyst bed; passing a small flow of reactants through the electrical heating element and catalyst bed; and heating the electrical heating element to initiate an exothermic reaction at the face of the catalyst bed, wherein the heat of reaction propagates throughout the catalyst bed thereby heating the catalyst bed for start-up.
2. The method of claim 1, wherein the electrical heating element is positioned along the upstream face of the catalyst bed.
3. The method of claim 1, wherein the electrical heating element is formed in a spiral design along one face of the catalyst bed.
4. The method of claim 1, wherein the catalyst bed is selected from the group consisting of pellets, extrudates, spheres, monoliths, and any combinations thereof.
5. The method of claim 1, wherein the catalyst bed contains catalyst selected from the group consisting of autothermal reforming catalysts, partial oxidation catalysts, steam reforming catalysts, water gas shift catalysts, preferential oxidation catalysts, anode tailgas oxidation catalysts, and sulfur absorbents.

13. A method for heating a catalyst bed, comprising: providing an electrical heating element positioned within a cooling coil located substantially within the catalyst bed; and heating the electrical heating element thereby heating the catalyst bed to a desired temperature.

14. The method of claim 13, wherein the desired temperature is the start-up temperature.

15. The method of claim 13, wherein the desired temperature is the desired reaction temperature during transient operation.

16. A method for heating a catalyst bed to a desired temperature, comprising: providing a catalyst bed in communication with an electrical heating element wherein the electrical heating element is a face heater; and heating the electrical heating element so as to maintain the desired temperature of the catalyst bed.

17. The method of claim 16, wherein the desired temperature is the start-up temperature.

18. The method of claim 16, wherein the desired temperature is the desired reaction temperature during transient operation.

19. The method of claim 16, wherein the electrical heating element is weaved through the catalyst bed.

20. The method of claim 16, wherein the catalyst bed is a monolith.

21. The method of claim 18, wherein the electrical heating element is wrapped around the monolith.

22. A method for heating a catalyst bed to a desired temperature, comprising: positioning an electrical heating element upstream of the catalyst bed wherein the electrical heating element is a face heater; and passing a fluid across the electrical heating element and through the catalyst bed, wherein the catalyst bed is heated to the desired temperature.

23. The method of claim 22, wherein the desired temperature is the start-up temperature.

24. The method of claim 22, wherein the desired temperature is the desired reaction temperature during transient operation.

Appeal Brief  
U.S.S.N. 10/006,875  
October 18, 2010

EVIDENCE APPENDIX

None.

Appeal Brief  
U.S.S.N. 10/006,875  
October 18, 2010

RELATED PROCEEDINGS APPENDIX

None.